This Upland Site Summary was authored by Texaco, Inc. The opinions, statements and conclusions herein are solely those of Texaco, Inc. They are not adopted by and should not be attributed to any other person.

FORMER PARAGON OIL TERMINAL

Address:	16, 42, 50 Bridgewater Street, Brooklyn, New York 11222
Tax Lot Parcel(s):	Brooklyn Block 2666, Lot 1; Block 2666, Lot 52; Block 2666, Lot 125;
Latitude:	40° 43' 40.461" N
Longitude:	73° 56' 8.8434" W
Regulatory Programs/Numbers/Codes:	Consent Order No. D2-1111-01-09AM
Analytical Data Status:	☒ Electronic Data Available ☐ Hardcopies only ☐ No Data Available

1.0 SUMMARY OF CONSTITUENTS OF POTENTIAL CONCERN (COPCS) TRANSPORT PATHWAYS TO THE CREEK

The current understanding of the transport mechanisms of contaminants from the upland portions of the former Paragon Oil Terminal site to Newtown Creek is summarized in this section and Table 1. A finished petroleum products terminal was operational on the site from 1934 to 1958 (Paragon Oil) and from 1959 to 1968 (Texaco). Neither company ever maintained petroleum refinery operations on the site.

1.1 Overland Transport

Overland transport is currently not a complete pathway for transport of any CPOCs to Newtown Creek due to the high level of development on the site. Greater than 95% of the site surface area is either paved or covered by buildings. No specific evidence of overland transport was identified in the historical and available site records. All finished petroleum products were stored in structures such as USTs and ASTs. In addition the storage of gasoline in USTs removed the potential for a complete overland pathway. There is insufficient evidence to indicate that the historical pathway was complete. The current pathway is incomplete.

1.2 Bank Erosion

The northern boundary of the site is located adjacent to Newtown Creek and is armored by bulkheads. Approximately 600 linear foot of steel sheet-pile bulkhead spans the western shoreline. A wooden bulkhead approximately 500 linear feet in length spans the eastern shoreline. There is no apparent potential for erosion and therefore the current bank erosion pathway is not considered complete. During terminal operations from 1934 to 1968 the shoreline was lined with bulkheads. No specific evidence of bank erosion was identified in the historical and available site records. There is insufficient evidence to indicate that the historical pathway was complete. The current pathway is incomplete.

1.3 Groundwater

In 1991, 23 years after terminal operations ceased, an LNAPL seep into the creek began. As part of the approved remedial action a total fluids recovery system was constructed and maintains a constant reversed hydraulic gradient inland from Newtown Creek during both high and low tides along the entire length of the former 1990 LNAPL seep location. This system has been operating since September 14, 2007. In addition a grout wall was installed behind the steel bulkhead in the former seep area to support the recovery system in mitigating the seep. The seep into Newtown Creek has been mitigated. Groundwater chemistry for CPOCs indicates that the majority of the dissolved-phase contamination exists in proximity to the LNAPL plume associated with the former seep. Groundwater is currently not a complete pathway.

The natural groundwater flow is, generally, from south to north across the property towards Newtown Creek. Since Newtown Creek is a tidal water body, the local groundwater immediately behind the bulkhead experiences tidal fluctuations. The current remedial system maintains hydraulic control under both high and low tidal conditions, with a continuous inward gradient from the Creek onto the site. However prior to the current remedial action, groundwater did discharge to the creek during low tide cycles. Therefore groundwater was a complete pathway during time when the seep began in 1991 until mitigation of the seep with the operation of the total fluids recovery system by the end of 2010. The hydraulic control provided by Texaco's system is also having the beneficial effect of addressing offsite sources of contamination that have migrated on to the Texaco site and are attributable to others." Groundwater is not a current pathway.

1.4 Overwater Activities

There are currently no over water activities at the site as it is currently a liquor distribution facility. Therefore this potential pathway is not currently complete. When the terminal was operational incoming finished petroleum products were offloaded by barge at the bulkhead area. A review of historical information did not suggest any other type of overwater activities. Terminal operations occurred between 1934 and 1968 and no records of spills have been located. Storage of the finished petroleum products was a primary function of terminal operations. Storage facilities included barges, pipes, and tanks. There was a much greater level of protection against spills in comparison to activities such as transport in open barges (coal, gravel, trash) and storage in open areas or bins on properties. There is insufficient evidence to indicate this pathway was historically complete

1.5 Stormwater/Wastewater Systems

The current storm water system captures runoff from the paved areas and the buildings on site via existing catch basins and conveys the stormwater through sub grade pipes to existing outfalls for discharge to Newtown Creek. Stormwater is potentially a complete pathway with respect to current conditions.

The total fluids recovery system separates the recovered LNAPL and groundwater using a primary fractionation tank and then an oil water separator (OWS). Recovered LNAPL is recycled off site. The groundwater is treated first with bag filters and an organoclay filtration unit and then with granular activated carbon. The treated groundwater is discharged to the sanitary sewer system in accordance

with a NYCDEP permit. Permit compliance monitoring occurs on a quarterly basis and the system has been compliant since startup in September 2007. Wastewater is not a current complete pathway.

In a 1959 Water Pollution Control Board document, Paragon Oil Company was identified as having an 8-inch diameter private outfall pipe to the creek. The discharge, which consisted of condensate from heaters and other steam consumers, washing and cleaning, and yard drainage, was pretreated with a four compartment oil water separator. The document also notes that the facility had a private sewer connected to the city sewer.

A 1960 New York City Survey Series Report No. 4 identified the OWS as being used for treatment of water from heating coils, truck washing, and surface drainage. A 1965 Bureau of Water Resource Services (NYSDOH) identified truck wash as being treated by an OWS and sewage by septic tanks.

1.6 Air Releases

A twice annual ambient air monitoring program has been ongoing since 2005. The outdoor and indoor sample results indicate the site air has not been adversely impacted. The current air pathway is not complete.

Information related to air releases was not identified in the available historical information reviewed. However, historical site information including aerial photographs did not show the presence of process units and associated air discharge stacks. This is consistent with terminal operations. There is insufficient evidence to indicate that the historical pathway to Newtown Creek was complete.

Table 1

Potential Areas of Concern and Transport Pathways Assessment - Former Paragon Oil Terminal

Potential Areas of Concern	Media Impacted					COPCs														Potential Complete Pathway					
						TPH			VOCs																	
Description of Areas of Concern	Surface Soil	Subsurface Soil	Groundwater	Catch Basin Solids	Creek Sediment	Gasoline-Range	Diesel-Range	Heavier-Range	Petroleum Related (BTEX)	VOCs	Chlorinated VOCs	SVOCs	PAHs	Phthalates	Phenolics	Metals	PCBs	Herbicides and Pesticides	Dioxins/Furans	Overland Transport	Groundwater	Direct Discharge - Overwater	Direct Discharge - Stormwater/Wastewater	Discharge to Sewer/CSO	Bank Erosion
Former Paragon Oil Terminal	--	--	✓	--	?	✓	✓	✓	✓	✓	***	✓	✓	--	--	--	--	--	--	--	*	--	--	**	--

Notes:

✓- COPCs are/were present in Areas of Concern and have a current or historical, complete or potentially complete pathway

? - Not enough information to make a determination

-- - Pathway is shown to be not present or incomplete

* - There is no evidence of a completed pathway during terminal operational years (1934 to 1968). The pathway was complete from 1991 to approximately 2010. The pathway is currently incomplete.

** - There is no evidence of a complete pathway during terminal operational years (1934 to 1968); current discharge from the recovery system undergoes pretreatment onsite prior to discharge to the sanitary sewer system in compliance with a NYCDEP permit.

*** - Isolated detections at one well on site likely attributed to upgradient and offsite sources

COPCs - Constituents of Potential Concern

NOTE: The table above presents information with respect to "Potential Complete Pathways" for historical conditions. Currently all pathways on the site are incomplete

2.0 PROJECT STATUS

A summary of the investigation and remedial activities is provided in the table below.

Activity		Date(s)/Comments
Phase 1 Environmental Site Assessment	☒	Prior to 2005 initial site characterization and interim remedial measures activities were completed by Roux Associates, on behalf of ExxonMobil;
Site Characterization	☒	Site-wide investigation was completed from 2005 to 2007; summarized in Site Characterization Reports dated October 2006, February 2007, and October 2010;
Remedial Investigation	☒	See Site Characterization discussion.
Remedy Selection	☒	The seep mitigation remedy consists of a groundwater & LNAPL recovery system, a grout wall barrier, and sealed seams in the bulkhead. Selections completed in 2005 and 2006;
Remedial Design/Remedial Action Implementation	☒	Phase I Remedial designs were competed in 2006; the grout wall was installed in 2006; the recovery system was activated in September 2007; Phase II remedial upgrades were designed in 2009; Site wide Alternatives Analysis Reports for GW, LNAPL, Soil & Soil Vapor submitted in 2011;
Use Restrictions (Environmental Easements or Institutional Controls)	☒	The site has a zoning classification of M3-1, heavy manufacturing zoning district;
Construction Completion	☒	Installation of the grout wall behind the steel sheet-pile bulkhead in November 2006; completion of the Phase I total fluids recovery system in September 2007; completion of the seam-sealing of the steel sheet-pile bulkhead in the summer of 2008; initiation of the warehouse slab maintenance sealing activities in 2008 (continues to present); the completion of the Phase II total fluids recovery system upgrades in 2009; and the completion of the voluntary Subslab Depressurization System in 2010.
Site Closeout/No Further Action Determination		Not applicable at this time

- NYSDEC Site Code(s): S224083

- NYSDEC Site Manager: Mr. Ed Hampston, PE; Albany, NY

3.0 SITE OWNERSHIP HISTORY

Respondent Member: Yes ☒ No (Respondent is not the current owner)

Year	16 Bridgewater Parcel A (Lot 125)	16 Bridgewater Parcel B (Lot 125)	42 Bridgewater (Lot 52)	50 Bridgewater (Lot 1)
Pre-1920	_	_	ACME Food Products Corp.	_
1920-1930	_	_	Abington Chemical Works (Sub-Lease)	_
Pre-1928	_	_	_	Heirs of A. Cram
1928-1934	_	_	_	Brooklyn Ash Removal Co.
pre-1931	Clifford L. Miller	Clifford L. Miller	_	_
1934	_	_	_	Bridgewater Oil Co.
1934-1959	Paragon Oil	Paragon Oil	Paragon Oil	Paragon Oil
1959-1968	Texaco	Texaco	Texaco	Texaco
1968-2006	Peerless Importers	Peerless Importers	Peerless Importers	Peerless Importers
2007-current	Peerless Equities, LLCs	Peerless Equities, LLC	Peerless Equities, LLC	Peerless Equities, LLC

4.0 PROPERTY DESCRIPTION

The 11 acre former Paragon Oil terminal site borders Newtown Creek on the north, Meeker Avenue on the east, Bridgewater Street on the south, and the 100-120 Apollo Street property on the west. The former terminal was a distributor of fuel oils (#'s 2, 4, and 6), lubricating oil, leaded gasoline, diesel fuel, and kerosene. The terminal did not store crude oil, naphtha, or unleaded gasoline. The terminal contained two truck loading racks, several USTs and ASTs, transfer pipes and pumps, a motor oil canning warehouse, and a boiler room for steam generation. Terminal operations ceased in 1968.

Currently, greater than 95% of the site surface is covered by asphalt or warehouses. The entire shoreline is lined with bulkheads. A steel bulkhead installed in 2000 spans the western two-thirds of the shoreline. A competent wooden bulkhead lines the eastern third of the shoreline.

5.0 CURRENT SITE USE

Currently, the 11 acre property is owned by Peerless Equities, LLC and is a series of interconnected warehouses that cover 8 acres of the property. The remainder of the property is comprised of truck parking, car parking, and truck loading bays. The site has limited access and is secured by chain-link fencing with razor wire with access control points monitored by security. Currently, the facility

operates a wholesale wine and spirits distribution business from the warehouses located at the site. Nearly the entire surface of the site is covered with concrete warehouse floors or asphalt pavement. Office space is located on the south side of the property at 16 and 50 Bridgewater Streets and conference rooms are also located on the north side of the property at 50 Bridgewater Street.

6.0 SITE USE HISTORY

The Paragon Oil Company maintained terminal operations at the site between 1934 and 1958. In 1958, Texaco continued petroleum terminal operations until 1968, when the terminal was closed and the property sold to Peerless Importers (currently Peerless Equities, LLC). The former Paragon Oil terminal stored finished petroleum products including diesel fuel, No. 2 fuel oil, No. 4 fuel oil, No. 6 fuel oil, lubricating oil, leaded gasoline and kerosene. The site has a zoning classification of M3-1, heavy manufacturing zoning district.

Mobil operated the Locust Hill Refinery on the site. At some point in time, Mobil consolidated the Locust Hill Refinery into its Sone and Fleming Refinery, which was Mobil's largest refinery on Newtown Creek. The Locust Hill refinery operations terminated sometime prior to Paragon's entry on to the property.

7.0 CURRENT A ND HISTORICAL AREAS OF CONCERN AND COPCS

7.1 Uplands

In 1978, a petroleum sheen was observed seeping into Newtown Creek at the base of Meeker Avenue (offiste) by the United States Coast Guard (USCG). This discovery led to an investigation by Geraghty & Miller, Inc., to determine the source of the seep and the extent of LNAPL present in the subsurface. Key findings from the USCG commissioned report prepared by Geraghty & Miller are indicated below:

- "14. Based on the evidence of a majority of laboratories and physical evidence, the product appears to be predominantly a petroleum distillate with a minor amount of refined products."
- "23. A former Paragon Oil Company storage facility situated along Bridgewater Street and operated until 1935 is not the source, as it did not store the type of product found in the subsurface. In addition, test drilling at this site shows that the spill did not originate from this site."

In 1991, 23 years after the terminal shut down, an LNAPL seep was identified emanating from the former Paragon site bulkhead into Newtown Creek. Remediation efforts were implemented by Roux Associates from 1991 to 2005. In 2005 Texaco entered into a consent order with the NYSDEC and commenced characterization and corrective actions.

7.2 Overwater Activities

The terminal received finished petroleum products by barge at the bulkheads along the north property boundary. Aerial photographs have shown enclosed barges along the bulkhead and historical map information shows off loading transfer pipes at the bulkheads. The pipelines were connected to both ASTs and USTs.

7.3 Spills

There are no documented spills for the site associated with the historical terminal operations. Data collected on spills reported to the NYSDEC were searched as well historical newspaper accounts from the area.

In 1882, when the Mobil Locust Hill Oil Refinery \was operating, a lightning strike ignited a fire and a release at the refinery was reported in the September 16, 1882 New York Times.

8.0 PHYSICAL SITE SETTING

8.1 Geology

The site is underlain by a unit of fill material that was put in place prior to 1900 based on available information. The fill is comprised of coarse-textured sand and gravel with man-made artifacts such as bricks, nails, glass, and other man-made materials. There exists a naturally occurring alluvial silt layer under the fill zone that extends from Newtown Creek southward toward Bridgewater Street. On the western part of the site the silt layer does not extend to Bridgewater Street. This alluvial silt zone was the base of Newtown Creek prior to 1886. Both the free water table and the upper surface of the LNAPL zone are present within the fill zone and above the alluvial silt layer. Underlying the alluvial silt layer at two locations are naturally occurring peat zones, and at greater depth, the native alluvial sand and gravel zone is present. On the Bridgewater Street side of the site, the alluvial sand and gravel is directly beneath the fill.

Figure 1 presents a stratigraphic cross section perpendicular to the creek while Figure 2 presents a stratigraphic cross section parallel to the creek.

8.2 Hydrogeology

As previously stated, the water table and the LNAPL are present underneath the site within the upper fill zone Figure 3 presents a concept diagram of the reversed hydraulic gradient that is created and maintained by the total fluids recovery system that is operating behind the bulkhead. Figure 4 presents an actual low tide data set indicating the pumping groundwater elevations behind the bulkhead are all below the elevation of the creek surface water elevation. The maintenance of this reversed hydraulic gradient has been effective in mitigating the seep. Figure 5 presents the LNAPL and groundwater capture zone induced by each of the recovery wells behind the bulkhead at low tide. The reversed inward gradient created by the pumping behind the bulkhead ensures that both groundwater and PSH do not seep into Newtown Creek.

9.0 NATURE AND EXTENT (CURRENT UNDERSTANDING OF ENVIRONMENTAL CONDITIONS)

9.1 Soil

9.1.1 Soil Investigations ☒ Yes ☐ No

Thirty-seven soil borings were completed on the Paragon site between July 2005 and July 2007. Most borings were completed using rotosonic drilling techniques and were continuously sampled to depth. Due to low overhead clearance, two borings were completed using direct push technologies, and continuously sampled to their total depth. All of these borings were completed under the direction of SAIC. Once a boring location was chosen, the first five (5) feet of each borehole was advanced using non-intrusive techniques (water knife).

Field Soil Descriptions

Continuous soil samples were collected at each boring location and the physical and morphological properties of the soil were documented in the field using the Unified Soil Classification System. In an effort to maintain consistency among field personnel, all soils were described using the following parameters: Munsell color, USCS group name and symbol, estimated grain size composition (%), angularity, plasticity, moisture, consistency, odors, presence stratifications, and the presence of fill material containing manmade artifacts.

Field Screening Methods

Soil samples collected in the field were screened for the relative concentration of petroleum volatile organic compounds (VOCs) using both a photoionization detector (PID) and a flame ionization detector (FID).

Laboratory Analyses

From the boring completed in 2005 and 2006 one soil sample was collected from each boring for laboratory analysis. Each soil sample was collected from the interval yielding the highest volatile reading in the vadose zone as measured with a PID. Samples were collected for analysis of NYSDEC STARS List Compounds for Gasoline & Fuel Oil parameters. All soil chemical analyses were completed by either Severn Trent Laboratories (STL) of Edison, New Jersey, or Test America in Nashville, Tennessee.

In 2007 multiple soil samples were collected from each boring location for laboratory analysis. Soil samples were collected from the depth yielding the highest volatile field reading in the vadose zone for each five foot core interval. The sample approach was completed for the saturated zone. Samples were collected for analysis of NYSDEC STARS List Compounds for Gasoline & Fuel Oil parameters.

9.1.2 Bank Samples ☐ Yes ☒ No

The western two-thirds of the site contain a steel bulkhead with an asphalt surface landside. There is no bank soil in this area. The eastern third contains a wooden bulkhead that has a limited vegetated

area between the bulkhead and the asphalt parking lot. Bank soil samples have not been collected from this area. However this area of the site did not contain terminal infrastructure.

9.1.3 Soil Summary

A summary of soil sample analytical results is presented in Table 2. There are limited impacts to the unsaturated zone soil. Limited volatile petroleum compounds exceed the commercial use soil standards. Low concentrations of PAHs are present in the unsaturated zone soil. The parent PAHs are primarily of pyrogenic origin with urban fill as the source of the PAHs. Pyrogenic PAHs are not commonly found in petroleum products and are more representative of products of combustion.

Table 2
Summary of Soil COPC Chemistry
Former Paragon Oil Terminal
Greenpoint, Brooklyn, NY

Analyte	Units	NYSDEC Restricted Use Standards		Soil Concentration	
		Commercial	Industrial	Minimum	Maximum
Surface (0-2 ft below ground surface)					
1,2,4-Trimethylbenzene	mg/kg	190	380	ND	0.065
1,2-Dichloroethane	mg/kg	30	60	ND	ND
1,3,5-Trimethylbenzene	mg/kg	190	380	ND	0.039
Acenaphthene	mg/kg	500	1000	0.27	0.36
Acenaphthylene	mg/kg	500	1000	ND	0.097
Anthracene	mg/kg	500	1000	0.22	1.4
Benzene	mg/kg	44	89	ND	0.32
Benzo(a)anthracene	mg/kg	5.6	11	0.37	1.5
Benzo(a)pyrene	mg/kg	1	1.1	0.24	0.97
Benzo(b)fluoranthene	mg/kg	5.6	11	0.48	1.7
Benzo(g,h,i)perylene	mg/kg	500	1000	0.13	0.78
Benzo(k)fluoranthene	mg/kg	56	110	ND	0.49
Chrysene	mg/kg	56	110	0.41	1.4
Dibenz(a,h)anthracene	mg/kg	0.56	1.1	0.04	0.19
Ethylbenzene	mg/kg	390	780	ND	0.2
Fluoranthene	mg/kg	500	1000	1.6	5.4
Fluorene	mg/kg	500	1000	ND	0.63
Indeno(1,2,3-cd)pyrene	mg/kg	5.6	11	0.12	0.71
Lead	mg/kg	1000	3900	124	35.4
Methyl-t-Butyl Ether (MTBE)	mg/kg	500	1000	ND	ND
Naphthalene	mg/kg	500	1000	ND	8.9

n-Butylbenzene	mg/kg	500	1000	ND	0.008
n-Propylbenzene	mg/kg	500	1000	ND	0.044
Phenanthrene	mg/kg	500	1000	0.84	3.2
Pyrene	mg/kg	500	1000	1.2	4.5
sec-Butylbenzene	mg/kg	500	1000	ND	0.005
tert-Butylbenzene	mg/kg	500	1000	ND	ND
Toluene	mg/kg	500	1000	ND	0.015
Xylenes, total	mg/kg	500	1000	ND	0.3
Sub-Surface (>2 ft below ground surface)					
1,2,4-Trimethylbenzene	mg/kg	190	380	ND	1440
1,2-Dichloroethane	mg/kg	30	60	ND	ND
1,3,5-Trimethylbenzene	mg/kg	190	380	ND	639
Acenaphthene	mg/kg	500	1000	ND	7.32
Acenaphthylene	mg/kg	500	1000	ND	2.3
Anthracene	mg/kg	500	1000	ND	18
Benzene	mg/kg	44	89	ND	226
Benzo(a)anthracene	mg/kg	5.6	11	ND	22
Benzo(a)pyrene	mg/kg	1	1.1	ND	19
Benzo(b)fluoranthene	mg/kg	5.6	11	ND	22
Benzo(g,h,i)perylene	mg/kg	500	1000	ND	9.9
Benzo(k)fluoranthene	mg/kg	56	110	ND	20
Chrysene	mg/kg	56	110	ND	20
Dibenz(a,h)anthracene	mg/kg	0.56	1.1	ND	2.7
Ethylbenzene	mg/kg	390	780	ND	460
Fluoranthene	mg/kg	500	1000	ND	55
Fluorene	mg/kg	500	1000	ND	11.8
Indeno(1,2,3-cd)pyrene	mg/kg	5.6	11	ND	9.4
Lead	mg/kg	1000	3900	0.547	2220
Methyl-t-Butyl Ether (MTBE)	mg/kg	500	1000	ND	0.013
Naphthalene	mg/kg	500	1000	ND	266
n-Butylbenzene	mg/kg	500	1000	ND	146
n-Propylbenzene	mg/kg	500	1000	ND	203
Phenanthrene	mg/kg	500	1000	ND	58
Pyrene	mg/kg	500	1000	ND	48
sec-Butylbenzene	mg/kg	500	1000	ND	49.1
tert-Butylbenzene	mg/kg	500	1000	ND	2.72
Toluene	mg/kg	500	1000	ND	56.1
Xylenes, total	mg/kg	500	1000	ND	1810

Notes:
mg/kg - milligrams per kilogram
ND - Non-detect

9.2 Groundwater

Groundwater Investigations ☒Yes No

LNAPL Presence (Historical & Current) ☒ Yes No

Dissolved COPC Plumes ☒ Yes No

Visual Seep Sample Data Yes ☒ No

9.2.1 Groundwater Investigations

Texaco has been completing annual groundwater sampling events since 2010. Groundwater samples were collected from monitoring wells that did not contain LNAPL and were collected using USEPA low-flow collection protocols. All samples were analyzed for the NYSDEC STARS gasoline and fuel oil compounds. In addition, approximately 10% of the samples were analyzed for TCL VOCs and SVOCs, dissolved RCRA metals, total dissolved solids (TDS), and Arochlors. The samples were analyzed by TestAmerica Laboratories using Methods 8260B, 8270C, 8082, 6010B, 7470A, and 2540C.

9.2.2 LNAPL

Currently, 18 monitoring wells onsite have a measurable LNAPL thickness while 39 wells onsite do not contain LNAPL. The subsurface LNAPL extent is interpreted to extend across nearly the entire area of 50 Bridgewater Street, and about two thirds of 42 Bridgewater Street. At 16 Bridgewater Street limited LNAPL exists in the south east portion of the lot. Figure 6 depicts the interpretation of the current LNAPL extent on the site.

9.2.3 Groundwater Summary

A groundwater data summary is presented in Table 3 and Table 4. Groundwater impacts mirror the LNAPL plume. The primary compounds impacting the groundwater are BTEX compounds and other petroleum related volatile compounds. A limited extent of pyrogenic PAHs at low concentrations is present in the groundwater. Arochlors are not present in the groundwater on the Paragon site. At one well location, CMW-24S, chlorinated VOC degradation products are present. The chlorinated VOCs are absent from the groundwater at 9 additional monitoring well locations on the site.

Table 3
Summary of Groundwater Hydrocarbon COPC Chemistry
Former Paragon Oil Terminal
Greenpoint, Brooklyn, NY

		Water Quality Standard		Groundwater Concentration	
Analyte	**Units**	**Aesthetic**	**Human Health**	**Minimum**	**Maximum**
1,2,4-Trimethylbenzene	ug/L		5	ND	190
1,3,5-Trimethylbenzene	ug/L		5	ND	130
Acenaphthene	ug/L	20		ND	140
Anthracene	ug/L		50	ND	1.6

Benzene	ug/L		1	ND	4800
Benzo(a)anthracene	ug/L		0.002	ND	1.2
Benzo(a)pyrene	ug/L			ND	1.9
Benzo(b)fluoranthene	ug/L		0.002	ND	ND
Benzo(k)fluoranthene	ug/L		0.002	ND	ND
Chrysene	ug/L		0.002	ND	0.33
Ethylbenzene	ug/L		5	ND	900
Fluoranthene	ug/L		50	ND	3.1
Fluorene	ug/L		50	ND	45
Indeno(1,2,3-cd)pyrene	ug/L		0.002	ND	1.3
Isopropylbenzene	ug/L		5	ND	41
Methyl-t-Butyl Ether (MTBE)	ug/L		10	ND	200
m,p-Xylenes	ug/L		5	ND	970
Naphthalene	ug/L	10		ND	77
n-Butylbenzene	ug/L		5	ND	8.8
N-Propylbenzene	ug/L		5	ND	61
o-Xylene	ug/L		5	ND	36
p-Cymene	ug/L		5	ND	5.2
Phenanthrene	ug/L		50	ND	28
Pyrene	ug/L		50	ND	1.6
sec-Butylbenzene	ug/L		5	ND	4.4
tert-Butylbenzene	ug/L		5	ND	ND
Toluene	ug/L		5	ND	100

Notes:

ug/L - micrograms per liter
ND - Non-detect

Table 4
Summary of Groundwater TAL COPC Chemistry
Former Paragon Oil Terminal
Greenpoint, Brooklyn, NY

		Water Quality Standard		2010-2011 Groundwater Concentration	
Analyte	**Units**	**Aesthetic**	**Human Health**	**Minimum**	**Maximum**
VOCs					
1,1,1-Trichloroethane	ug/L		5	ND	ND
1,1,2,2-Tetrachloroethane	ug/L		5	ND	ND

1,1,2-Trichloro-1,2,2-trifluoroethane	ug/L		5	ND	ND
1,1,2-Trichloroethane	ug/L		1	ND	ND
1,1-Dichloroethane	ug/L		5	ND	ND
1,1-Dichloroethene	ug/L		5	ND	ND
1,2,4-Trichlorobenzene	ug/L	10	5	ND	ND
1,2-Dibromo-3-chloropropane	ug/L		0.04	ND	ND
1,2-Dibromoethane (EDB)	ug/L		0.0006	ND	ND
1,2-Dichlorobenzene	ug/L		3	ND	ND
1,2-Dichloroethane	ug/L		0.06	ND	ND
1,2-Dichloroethene, Total	ug/L			ND	24
1,2-Dichloropropane	ug/L		1	ND	ND
1,3-Dichlorobenzene	ug/L		3	ND	ND
1,4-Dichlorobenzene	ug/L		3	ND	ND
2-Butanone (MEK)	ug/L		50	ND	17
2-Hexanone	ug/L		50	ND	ND
4-Methyl-2-pentanone (MIBK)	ug/L			ND	ND
Acetone	ug/L		50	ND	43
Bromodichloromethane	ug/L		50	ND	ND
Bromoform	ug/L		50	ND	ND
Bromomethane	ug/L		5	ND	ND
Carbon disulfide	ug/L		60	ND	ND
Carbon Tetrachloride	ug/L		5	ND	ND
Chlorobenzene	ug/L		5	ND	ND
Chloroethane	ug/L		5	ND	3.6
Chloroform	ug/L		7	ND	6
Chloromethane	ug/L		5	ND	ND
cis-1,2-Dichloroethene	ug/L		5	ND	24
cis-1,3-Dichloropropene	ug/L		0.4	ND	ND
Cyclohexane	ug/L			ND	200
Dibromochloromethane	ug/L		50	ND	ND
Dichlorodifluoromethane	ug/L		5	ND	ND
Methyl Acetate	ug/L			ND	ND
Methylcyclohexane	ug/L			ND	240
Methylene Chloride	ug/L		5	ND	ND
Styrene	ug/L		5	ND	ND
Tetrachloroethene	ug/L		5	ND	ND
trans-1,2-Dichloroethene	ug/L		5	ND	ND
trans-1,3-Dichloropropene	ug/L		0.4	ND	ND
Trichloroethene	ug/L		5	ND	ND
Trichlorofluoromethane	ug/L		5	ND	ND
Vinyl chloride	ug/L		2	ND	14

SVOCs					
1,1'-Biphenyl	ug/L		5	ND	ND
2,4,5-Trichlorophenol	ug/L			ND	ND
2,4,6-Trichlorophenol	ug/L			ND	ND
2,4-Dichlorophenol	ug/L		5	ND	ND
2,4-Dimethylphenol	ug/L		50	ND	ND
2,4-Dinitrophenol	ug/L		10	ND	ND
2,4-Dinitrotoluene	ug/L		5	ND	ND
2,6-Dinitrotoluene	ug/L		5	ND	ND
2-Chloronaphthalene	ug/L		10	ND	ND
2-Chlorophenol	ug/L			ND	ND
2-Methylnaphthalene	ug/L			ND	8.7
2-Methylphenol	ug/L			ND	ND
2-Nitroaniline	ug/L		5	ND	ND
2-Nitrophenol	ug/L			ND	ND
3,3'-Dichlorobenzidine	ug/L		5	ND	ND
3-Nitroaniline	ug/L		5	ND	ND
4,6-Dinitro-2-methylphenol	ug/L			ND	ND
4-Bromophenyl phenyl ether	ug/L			ND	ND
4-Chloro-3-methylphenol	ug/L			ND	ND
4-Chloroaniline	ug/L		5	ND	ND
4-Chlorophenyl phenyl ether	ug/L			ND	ND
4-Methylphenol	ug/L			ND	ND
4-Nitroaniline	ug/L		5	ND	ND
4-Nitrophenol	ug/L			ND	ND
Acenaphthylene	ug/L			ND	1.9
Acetophenone	ug/L			ND	7.3
Atrazine	ug/L		7.5	ND	ND
Benzaldehyde	ug/L			ND	ND
Benzo(g,h,i)perylene	ug/L			ND	0.83
Bis(2-chloroethoxy)methane	ug/L		5	ND	ND
Bis(2-chloroethyl)ether	ug/L		1	ND	ND
Bis(2-chloroisopropyl) ether	ug/L		5	ND	ND
Bis(2-ethylhexyl) phthalate	ug/L		5	ND	1.8
Butyl benzyl phthalate	ug/L		50	ND	ND
Caprolactam	ug/L			ND	10
Carbazole	ug/L			ND	4.2
Dibenz(a,h)anthracene	ug/L			ND	1.1
Dibenzofuran	ug/L			ND	7.3
Diethyl phthalate	ug/L		50	ND	0.74
Dimethyl phthalate	ug/L		50	ND	ND

Di-n-butyl phthalate	ug/L		50	ND	0.74
Di-n-octyl phthalate	ug/L		50	ND	ND
Hexachlorobenzene	ug/L		0.04	ND	ND
Hexachlorobutadiene	ug/L		0.5	ND	ND
Hexachlorocyclopentadiene	ug/L		5	ND	ND
Hexachloroethane	ug/L		5	ND	ND
Isophorone	ug/L		50	ND	ND
Nitrobenzene	ug/L		0.4	ND	ND
N-Nitrosodi-n-propylamine	ug/L			ND	ND
N-Nitrosodiphenylamine	ug/L		50	ND	ND
Pentachlorophenol	ug/L			ND	ND
Phenol	ug/L	1		ND	ND
PCBs					
Aroclor 1016	ug/L			ND	ND
Aroclor 1221	ug/L			ND	ND
Aroclor 1232	ug/L			ND	ND
Aroclor 1242	ug/L			ND	ND
Aroclor 1248	ug/L			ND	ND
Aroclor 1254	ug/L			ND	ND
Aroclor 1260	ug/L			ND	ND
Aroclor 1262	ug/L			ND	ND
Aroclor 1268	ug/L			ND	ND
Metals (Dissolved)					
Arsenic	ug/L		25	ND	15
Barium	ug/L		1000	250	2800
Cadmium	ug/L		5	0.47	0.74
Chromium	ug/L		50	ND	1.3
Lead	ug/L		25	ND	4.4
Mercury	ug/L		0.7	ND	ND
Selenium	ug/L		10	ND	ND
Silver	ug/L		50	ND	ND

Notes:
ug/L - micrograms per liter
ND - Non-detect

9.3 Surface Water

Surface Water Investigation Yes ☒ No

SPDES Permit (Current or Past) Yes ☒No

Industrial Waste Discharge Permit ☒ Yes No

Stormwater Data Yes ☒ No

Catch Basin Solids Data Yes ☒ No

Wastewater Data ☒Yes No

In 2007, Texaco received a discharge permit from the NYCDEP that allows for the discharge of treated groundwater from the recovery system to be discharged to the sewer system after pre-treatment onsite. The permit is renewed on an annual basis. Currently and in accordance with a June 14, 2011, approval letter from NYCDEP, Texaco is conditionally authorized to discharge 43,200 gpd of treated effluent to the combined sewer. Compliance with the discharge permit requires one sample to be collected quarterly from the final treated discharge and analyzed for the list of constituents. Permit compliance has been maintained through the 4th quarter of 2011. Table 5 presents the most current results.

Table 5
NYCDEP Discharge Permit Compliance Results
January 1, 2012 to March 31, 2012

Analyte	NYCDEP Concentration Limit		TS-4 Post GAC 2: Treated Effluent (2/28/2012)
	Daily	Monthly	
1,1,1-Trichloroethane (ug/L)			<5.0
1,2,4-Trichlorobenzene (ug/L)			<9.8
1,4-Dichlorobenzene (ug/L)			<5.0
Aroclor 1016 (ug/L)			<0.057
Aroclor 1221 (ug/L)			<0.057
Aroclor 1232 (ug/L)			<0.057
Aroclor 1242 (ug/L)			<0.057
Aroclor 1248 (ug/L)			<0.057
Aroclor 1254 (ug/L)			<0.057
Aroclor 1260 (ug/L)			<0.057
Benzene (ug/L)	134	57	6.8
Cadmium - Total (mg/L)	2		0.00082J
Carbon Tetrachloride (ug/L)			<5.0
Carbonaceous Biochemical Oxygen Demand (mg/L)			25.1
Chloride (mg/L)			10,500
Chloroform (ug/L)			<5.0
Copper - Total (mg/L)	5		0.0041J
Ethylbenzene (ug/L)	380	142	2.9J
Flashpoint (°F)	>140		>176.0

Hexavalent Chromium - Total (mg/L)	5		<0.010
Lead - Total (mg/L)	2		0.0035J
Mercury - Total (mg/L)	0.05		<0.00020
Methyl-t-Butyl Ether (ug/L)	50		<5.0
Naphthalene (ug/L)	47	19	2.2J
Nickel - Total (mg/L)	3		0.0033J
Nitrate-Nitrite (mg/L-N)			<0.050
pH, Field (S.U.)	5-12		6.83
Phenol (ug/L)			<4.9
SGT Total Petroleum Hydrocarbons (mg/L)	50		<4.9
Temperature, Field (°C)	<150		8.9
Tetrachloroethene (ug/L)	20		<5.0
Toluene (ug/L)	74	28	<5.0
Total Kjeldahl Nitrogen (mg/L-N)			1.1
Total Residue, at 103°C (mg/L)			19,700B
Total Suspended Solids (mg/L)	350		<4.0
Total Xylenes (ug/L)	74	28	3.2J
Zinc - Total (mg/L)	5		0.074

Five New York City outfalls along the site bulkhead were identified in AECOM's RI/FS Work plan dated June 2011.These outfalls are not associated with the Former Paragon Oil Terminal. These outfalls are shown on Figure 7, and described in Table 6 below.

Table 6: Outfalls identified in AECOM's RI/FS Work plan dated June 2011

Outfall ID	Outfall Location	Outfall Size	Type of Outfall	Property
NCB-0110060	10' W/O MEEKER STREET	3" DIA	Other NYC Identified Outfall	Former Paragon Oil Terminal
NCB-292	400' E/O APOLLO STREET	10" DIA	Other NYC Identified Outfall	Former Paragon Oil Terminal
NCB-294	500' E/O APOLLO STREET	12" DIA	Other NYC Identified Outfall	Former Paragon Oil Terminal
NCB-554	275' E/O APOLLO STREET	6" DIA	Other NYC Identified Outfall	Former Paragon Oil Terminal
NCB-555	25'W /O MEEKER AV	8" DIA	Other NYC Identified Outfall	Former Paragon Oil Terminal

9.4 Sediment

Creek Sediment Data Yes ☒ No

9.5 Air

Ambient air quality monitoring events have been ongoing since 2005 at the Empire Merchants warehouses and office spaces at 16, 42, and 50 Bridgewater Street on a bi-annual basis. Up to 16

SUMMA™ canisters are deployed across the site during each of the winter and summer sampling events. During the events, three SUMMA™ canisters are located outside of the buildings at ground level.

The laboratory results for ambient air quality monitoring events are summarized in Table 7. The laboratory data indicate that the subsurface LNAPL is not adversely affecting air quality.

Air Permit Yes ☒No

Air Data ☒ Yes No

Table 7
Summary of Ambient Air COPC Chemistry
Former Paragon Oil Terminal
Greenpoint, Brooklyn, NY

		Air Concentration	
Analyte	**Units**	**Minimum**	**Maximum**
1,1,1-Trichloroethane	ug/m3	0.4	3
1,1,2,2-Tetrachloroethane	ug/m3	ND	ND
1,1,2-Trichloroethane	ug/m3	ND	ND
1,1-Dichloroethane	ug/m3	ND	0.98
1,1-Dichloroethene	ug/m3	ND	ND
1,2,4-Trichlorobenzene	ug/m3	ND	ND
1,2,4-Trimethylbenzene	ug/m3	0.47	82
1,2-Dibromoethane	ug/m3	ND	ND
1,2-Dichlorobenzene	ug/m3	0.55	0.55
1,2-Dichloroethane	ug/m3	0.44	2.5
1,2-Dichloroethene, Total	ug/m3	ND	ND
1,2-Dichloropropane	ug/m3	3.6	4.1
1,2-Dichlorotetrafluoroethane	ug/m3	ND	ND
1,3,5-Trimethylbenzene	ug/m3	0.47	29
1,3-Butadiene	ug/m3	ND	ND
1,3-Dichlorobenzene	ug/m3	ND	ND
1,4-Dichlorobenzene	ug/m3	0.46	1.9
1,4-Dioxane	ug/m3	ND	ND
2,2,4-Trimethylpentane	ug/m3	0.85	280
2-Butanone (MEK)	ug/m3	0.97	41
2-Chlorotoluene	ug/m3	ND	ND
3-Chloropropene	ug/m3	ND	ND
4-Ethyltoluene	ug/m3	1.5	4.9
4-Isopropyltoluene	ug/m3	0.5	4.2

Acetone	ug/m3	6.4	220
Benzene	ug/m3	0.5	56
Benzyl chloride	ug/m3	ND	ND
Bromodichloromethane	ug/m3	ND	ND
Bromoethene	ug/m3	ND	ND
Bromoform	ug/m3	ND	ND
Bromomethane	ug/m3	ND	ND
Carbon disulfide	ug/m3	0.64	11
Carbon tetrachloride	ug/m3	0.47	8.2
Chlorobenzene	ug/m3	ND	ND
Chloroethane	ug/m3	0.29	1.5
Chloroform	ug/m3	0.41	2.8
Chloromethane	ug/m3	0.82	3.9
cis-1,2-Dichloroethane	ug/m3	ND	0.39
cis-1,2-Dichloroethene	ug/m3	2.2	41
cis-1,3-Dichloropropene	ug/m3	ND	ND
Cumene	ug/m3	1.1	86
Cyclohexane	ug/m3	0.5	490
Dibromochloromethane	ug/m3	ND	ND
Dichlorodifluoromethane	ug/m3	1.2	15
Dichlorotetrafluoroethane	ug/m3	ND	ND
Ethanol	ug/m3	7.6	22000
Ethylbenzene	ug/m3	0.49	26
Freon 114	ug/m3	ND	ND
Freon 22	ug/m3	1.8	360
Freon TF	ug/m3	ND	1.7
Hexachlorobutadiene	ug/m3	18	18
Isopropyl Alcohol	ug/m3	12	130
m,p-Xylene	ug/m3	0.94	61
Methane	%	0.00021	0.0046
Methyl Butyl Ketone (2-Hexanone)	ug/m3	ND	ND
Methyl Butyl Ketone (2-Hexanone)	ug/m3	ND	ND
methyl isobutyl ketone	ug/m3	0.61	170
Methyl Methacrylate	ug/m3	2.8	13
Methyl tert-butyl ether	ug/m3	2.8	4.3
Methylene chloride	ug/m3	0.73	3300
Naphthalene	ug/m3	1.1	9.5
n-Butane	ug/m3	1.2	78
n-Butylbenzene	ug/m3	ND	ND
n-Heptane	ug/m3	0.94	15
n-Hexane	ug/m3	0.72	25

n-Hexane	ug/m3	0.72	550
n-Propylbenzene	ug/m3	0.64	10
o-Xylene	ug/m3	0.46	21
sec-Butylbenzene	ug/m3	1.3	3
Styrene	ug/m3	0.41	7.3
tert-Butyl alcohol	ug/m3	5.7	5.7
Tert-Butylbenzene	ug/m3	ND	ND
Tetrachloroethene	ug/m3	0.49	48
Tetrahydrofuran	ug/m3	ND	ND
Toluene	ug/m3	1.2	90
trans-1,2-Dichloroethene	ug/m3	ND	ND
trans-1,3-Dichloropropene	ug/m3	ND	ND
Trichloroethene	ug/m3	0.31	4.9
Trichlorofluoromethane	ug/m3	1	23
Vinyl chloride	ug/m3	ND	ND
Xylenes, Total	ug/m3	1.1	26

Notes:
ug/m3 - micrograms per cubic meter
mg/m3 - miligrams per cubic meter
ND - Non-detect

10.0 REMEDIATION HISTORY (INTERIM REMEDIAL MEASURES AND OTHER CLEANUPS)

Texaco has been conducting investigation and remedial action activities at the Paragon site since June 2005. Investigation activities have included:

- delineating the extent of petroleum-impacted soil,
- delineating the extent of petroleum-impacted groundwater, and
- delineating and identifying the source of the subsurface LNAPL in the saturated zone.

SAIC detailed the procedures, results, and interpretations of site characterization activities in the Site Characterization Report (2006) and Supplemental Site Characterization Reports (2007 and 2010).

An interim remedial measure (IRM) at the site focuses on eliminating a petroleum seep into Newtown Creek. The efforts included:

- installation of a below grade grout wall along the bulkhead,
- sealing seams on the steel bulkhead,
- operation of a 13-well Total Fluids Recovery (TFR) system, and
- maintenance of a creek-side containment boom system.

The collective efforts described above were initiated in 2006 and have successfully mitigated the petroleum seepage into the creek.

The grout wall is located immediately behind the steel bulkhead on the Paragon site in the vicinity of a historical seep of LNAPL into Newtown Creek. Grout wall construction was completed in November 2006. This grout wall extends 7 feet above and 7 feet below mean sea level.

Seams in the existing steel bulkhead were sealed with marine epoxy in September 2008. Monthly inspections are made and maintenance activities have been performed to maintain the competence of the sealed seams.

A TFR system recovers groundwater and LNAPL from a system of 11 recovery wells located immediately behind the grout wall on the Paragon site (Figure 8). The removal of LNAPL and impacted groundwater in order to maintain a reversed groundwater gradient away from the creek, has contributed to mitigating the seep.

A summary of characterization and remediation activates on the site is as follows:

- Delineation of soil and groundwater impacts
- Delineation of and identifications of the source of LNAPL
- Seep mitigation activities including grout wall installation, bulkhead seam sealing, maintenance of a creekside boom system, and operation of a TFR system.

The recovery system currently maintains a reversed hydraulic gradient during both high and low tide on the creek. The inward gradient is achieved by maintaining a groundwater elevation that is below the creek surface water elevation at both low and high tides. In 2011 NYSDEC gave Texaco approval to remove the outer containment boom system.

11.0 BIBLIOGRAPHY

SAIC Documents

Initial Site Characterization Report for the Former Paragon Oil Facility, October 29, 2004

Initial Site Characterization Report Addendum 1, October 29, 2004

Former Paragon Oil Terminal, Conceptual Work Plan for Corrective Action Activities, February 8, 2005

Conceptual Work Plan Addendum No. 1 and Project Schedule, Former Paragon Oil Property, May 6, 2005

Former Paragon Oil Terminal, Monthly Status Report #1, July 21, 2005

Second Quarter 2005 Operation and Maintenance Report, Peerless Importers Containment Boom, August 15, 2005

Former Paragon Oil Terminal, Health and Safety Air Monitoring During Well Installation Activities, August 29, 2005

Former Paragon Oil Terminal, Status Report - June 1, 2005 through September 30, 2005, October 28, 2005

Third Quarter 2005 Operation and Maintenance Report, Newtown Creek Containment Boom, Peerless Importers Property, November 15, 2005

Former Paragon Oil Terminal, Status Report - October 1, 2005 through November 30, 2005, December 30, 2005

Former Paragon Oil Terminal, Newtown Creek Seep Containment System & Landside Recovery System, Correspondence between SAIC and NYSDEC, January 19, 2006

Former Paragon Oil Terminal, Status Report - October 1, 2006 through December 31, 2006, January 24, 2006

Former Paragon Oil Terminal, Peerless Importers Air Monitoring Correspondence between SAIC and NYSDEC, January 27, 2006

Fourth Quarter 2005 Operation and Maintenance Report, Newtown Creek Containment Boom, Peerless Importers Property, February 3, 2006

Former Paragon Oil Terminal, Comparative Analysis for the Enhanced Creek Side Containment Alternatives, February 22, 2006

Former Paragon Oil Terminal, March 6, 2006 Status Report, March 6, 2006

Former Paragon Oil Terminal, Status Report - December 1, 2005 through December 31, 2005, March 6, 2006

Former Paragon Oil Terminal, Status Report - January 1, 2006 through January 31, 2006, March 8, 2006

Former Paragon Oil Terminal, Status Report - February 1, 2006 through February 28, 2006, April 4, 2006

Former Paragon Oil Terminal, Status Report - March 1, 2006 through March 31, 2006, April 24, 2006

RE: Former Paragon Oil Terminal - Long Term Remediation Alternatives and Implementation, Correspondence between Texaco and NYSDEC, April 27, 2006

RE: Implementation of Free Product Recovery System Installation at the Former Paragon Oil Terminal, Correspondence between Texaco and NYSDEC, May 11, 2006

Former Paragon Oil Terminal, Grout Injection Pilot Study Evaluation, May 23, 2006

Former Paragon Oil Terminal, Status Report - April 1, 2006 through April 30, 2006, June 1, 2006

RE: Groundwater Remediation Project - Summary of Proposed Follow-up Action Items, Correspondence between Texaco and NYSDEC, June 9, 2006

RE: Transmittal of Information Requests from Project Teleconference of 12 June 2006, Correspondence between Texaco and NYSDEC, June 14, 2006

Summer 2006 Site Characterization Activities Work Plan, June 26, 2006

Former Paragon Oil Terminal, Status Report - May 1, 2006 through May 31, 2006, July 12, 2006

RE: Assessment and Remediation Activity Schedule at the Former Paragon Oil Terminal and Apollo Street Property, Correspondence between Texaco and NYSDEC, July 14, 2006

Former Paragon Oil Terminal, Revised Project Schedule & Milestones, Correspondence between SAIC and NYSDEC, August 11, 2006

Former Paragon Oil Terminal, Status Report - June 1, 2006 through June 30, 2006, August 22, 2006

Second Quarter 2006 Operation and Maintenance Report, Newtown Creek Containment Boom, Peerless Importers Property, August 22, 2006

Former Paragon Oil Terminal, Grout Wall Installation - Final Work Plan, August 31, 2006

Former Paragon Oil Terminal, Groundwater and Product Sampling and Analysis Plan - Final Work Plan Addendum No. 3, August 31, 2006

Former Paragon Oil Terminal, Final Phase I Recovery System Design, Correspondence between SAIC and NYSDEC, September 7, 2006

Former Paragon Oil Terminal, Site Characterization Report - Final Version, October 16, 2006

Former Paragon Oil Terminal, Status Report - August 1, 2006 through August 31, 2006, November 15, 2006

Former Paragon Oil Terminal, Status Report - September 1, 2006 through September 30, 2006, December 13, 2006

Former Paragon Oil Terminal, Proposed Additional Interim Product Recovery Activities, Correspondence between SAIC and NYSDEC, January 24, 2007

Supplemental Site Characterization Report for the Former Paragon Oil Terminal and Adjacent Areas, February 19, 2007

Former Paragon Oil Terminal #304209, Status Report - January 1, 2007 through January 31, 2007, March 12, 2007

Request for Authorization to Discharge Treated Groundwater to Combined Sewer; Dewatering Permit, Former Paragon Oil Terminal #304209, March 19, 2007

Former Paragon Oil Terminal, Texaco Facility #304209, Status Report - February 1, 2007 through February 28, 2007, March 30, 2007

Former Paragon Oil Terminal, Texaco Facility #304209, Request for Milestone Schedule Modification, Correspondence between SAIC and NYSDEC, April 3, 2007

Former Paragon Oil Terminal, Texaco Facility #304209, Status Report - March 1, 2007 through March 31, 2007, May 3, 2007

Response to Comments Addressing Dewatering Permit Application, Former Paragon Oil Terminal #304209, June 8, 2007

Former Paragon Oil Terminal, Texaco Facility #304209, Status Report - April 1, 2007 through April 3, 2007, June 11, 2007

Former Paragon Oil Terminal, Texaco Facility #304209, Status Report - May 1, 2007 through May 31, 2007, July 12, 2007

Former Paragon Oil Terminal, Texaco Facility #304209, Proposed Revision to Project Milestones, Correspondence between SAIC and NYSDEC, August 10, 2007

Former Paragon Oil Terminal, Texaco Facility #304209, Status Report - June 1, 2007 through June 30, 2007, August 15, 2007

Former Paragon Oil Terminal, Texaco Facility #304209, Phase I Recovery System Startup Completion, Correspondence between SAIC and NYSDEC, October 12, 2007

Former Paragon Oil Terminal, Texaco Facility #304209, Status Report - August 1, 2007 through August 31, 2007, November 1, 2007

Notification of Effluent Discharge, Correspondence between SAIC and NYSDEC, November 2, 2007

Former Paragon Oil Terminal, Texaco Facility #304209, Status Report - September 1, 2007 through September 30, 2007, December 7, 2007

Former Paragon Oil Terminal, Texaco Facility #304209, Status Report - October 1, 2007 through October 31, 2007, January 4, 2008

Former Paragon Oil Terminal, Texaco Facility #304209, November 1, 2007 through November 30, 2007, January 9, 2008

100-120 Apollo Street Property, Request to Prepare Seep Abatement Options Work Plan, Correspondence between SAIC and NYSDEC, January 22, 2008

Former Paragon Oil Terminal, Texaco Facility #304209, Status Report - December 1, 2007 through December 31, 2007, February 7, 2008

Former Paragon Oil Terminal, Texaco Facility #304209, Phase I Recovery System Evaluation Report, February 12, 2008

Former Paragon Oil Terminal, Texaco Facility #304209, Status Report - January 1, 2008 through January 31, 2008, March 6, 2008

Former Paragon Oil Terminal, Texaco Facility #304209, Status Report - February 1, 2008 through February 29, 2008, April 8, 2008

Former Paragon Oil Terminal, Texaco Facility #304209, Phase II Recovery System Conceptual Design, April 14, 2008

100-120 Apollo Street Property, Seep Abatement Options Work Plan, April 24, 2008

Former Paragon Oil Terminal, Texaco Facility #304209, Status Report - March 1, 2008 through March 31, 2008, May 12, 2008

Request for Water Quality Permit Renewal, Correspondence between SAIC and NYSDEC, May 28, 2008

Former Paragon Oil Terminal, Texaco Facility #304209, Recovery System - Phase II Upgrades Design, June 3, 2008

Request for Water Quality Permit Renewal, Correspondence between SAIC and NYSDEC, June 10, 2008

Former Paragon Oil Terminal, Texaco Facility #304209, Status Report - April 1, 2008 through April 30, 2008, June 12, 2008

Former Paragon Oil Terminal, Texaco Facility #304209, Residual Phase Hydrocarbon Vacuum Extraction Pilot Study Work Plan, June 27, 2008

100-120 Apollo Street Property, Remedial Options Assessment, July 11, 2008

Former Paragon Oil Terminal, Texaco Facility #304209, Status Report - May 1, 2008 through May 31, 2008, July 18, 2008

Request for Addendum to Water Quality Permit, Correspondence between SAIC and NYSDEC, August 13, 2008

Dewatering Permit Re-Application Request, August 13, 2008

Former Paragon Oil Terminal, Texaco Facility #304209, Status Report - June 1, 2008 through June 30, 2008, August 29, 2008

Total Fluids Recovery System Effluent Discharge , Correspondence between SAIC and NYSDEC, September 8, 2008

Estimated Treated Effluent Discharge Volume, Correspondence between SAIC and NYSDEC, September 8, 2008

100-120 Apollo St Property, Seep Abatement Interim Remedial Measures Workplan, September 25, 2008

Former Paragon Oil Terminal, Texaco Facility #304209, July 1, 2008 through July 31, 2008, October 1, 2008

Apollo Street Creek Parcel Seep Abatement IRM Plan, Correspondence between SAIC and NYSDEC, November 4, 2008

Former Paragon Oil Terminal, Texaco Facility #304209, August 1, 2008 through August 31, 2008, November 4, 2008

Former Paragon Oil Terminal, Texaco Facility #304209, September 1, 2008 through September 30, 2008, November 17, 2008

Former Paragon Oil Terminal, Texaco Facility #304209, Status Report - October 1, 2008 through October 31, 2008, December 29, 2008

Former Paragon Oil Terminal, Texaco Facility #304209, Status Report - November 1, 2008 through November 30, 2008, February 3, 2009

100-120 Apollo St. Property, Interim Remedial Measure Construction Summary Report and Operations, Maintenance & Monitoring Plan, February 10, 2009

Former Paragon Oil Terminal, Texaco Facility #304209, Status Report - December 1, 2008 through December 31, 2008, March 9, 2009

SAIC Response Letter - NYSDEC Status Report Comments and Recommendations , March 16, 2009

Request for Approval to Remove Creekside Outer Fence Boom, March 30, 2009

Proposed Vapor-Phase Recovery Design Submission Date, Correspondence between SAIC and NYSDEC, April 7, 2009

Former Paragon Oil Terminal and the 100-120 Apollo Street Property, Quarterly Status Report, January 1, 2009 to March 31, 2009, May 6, 2009

RE: Request for Water Quality Permit Renewal, May 20, 2009

Former Paragon Oil Terminal, Phase II Vapor Phase Recovery System Design, July 1, 2009

Former Paragon Oil Terminal, Sub-Slab Depressurization System, Design and Installation, Conference Room Area at 50 Bridgewater Street, July 7, 2009

RE: Dewatering Permit Renewal Request, Correspondence between SAIC and NYSDEC, July 28, 2009

Former Paragon Oil Terminal and Steel Equities Property, Texaco Facility #304209, Request for Work Plan Submission Extension, Correspondence between SAIC and NYSDEC, July 31, 2009

Former Paragon Oil Terminal and the 100-120 Apollo Street Property, Texaco Facility #304209, Quarterly Status Report, April 1, 2009 to June 30, 2009, July 31, 2009

Former Paragon Oil Terminal (Former Texaco Site #304209) and Apollo Street Property (Steel Equities) Sitewide Corrective Action Workplan, September 15, 2009

Former Paragon Oil Terminal and the 100-120 Apollo Street Property, Texaco Facility #304209, Quarterly Status Report, July 1, 2009 to September 30, 2009, October 31, 2009

Former Paragon Oil Terminal and the 100-120 Apollo Street Property, Texaco Facility #304209, Quarterly Status and Annual Progress Report, October 1, 2009 to December 31, 2009, January 29, 2010

Response to December 18, 2009 Work Plan Comments, February 18, 2010

Former Paragon Oil Terminal and the 100-120 Apollo Street Property, Texaco Facility #304209, Quarterly Status Report, January 1, 2010 to March 31, 2010, April 30, 2010

Request for Addendum to Water Quality Permit , May 3, 2010

RE: Dewatering Permit Re-Application Request, Correspondence between SAIC and NYSDEC, May 3, 2010

RE: Dewatering Permit Re-Application Request Cover Letter, Correspondence between SAIC and NYSDEC, May 3, 2010

RE: Request for Addendum to Water Quality Permit, Correspondence between SAIC and NYSDEC, May 3, 2010

Estimated Treated Effluent Discharge Volume, July 8, 2010

RE: Estimated Treated Effluent Discharge Volume,, Correspondence between SAIC and NYSDEC, July 8, 2010

Former Paragon Oil Terminal and the 100-120 Apollo Street Property, Texaco Facility #304209, Quarterly Status and Annual Progress Report, April 1, 2010 to June 3-, 2010, July 30, 2010

Former Paragon Oil Terminal and the 100-120 Apollo Street Property, Texaco Facility #304209, Quarterly Status, July 1, 2010 to September 30, 2010, October 29, 2010

Supplemental Site Characterization Report for the Former Paragon Oil Facility, 26 Bridgewater Street, Greenpoint, Brooklyn, New York, November 19, 2010

Former Paragon Oil Terminal and the 100-120 Apollo Street Property, Texaco Facility #304209, Quarterly Status and Annual Progress Report, Oct 1, 2010 to Dec 31, 2010, January 31, 2011

RE: Request for Addendum to Water Quality Permit, Correspondence between SAIC and NYSDEC, April 18, 2011

Former Paragon Oil Terminal and the 100-120 Apollo Street Property, Texaco Facility #304209, Quarterly Status Report Jan-Mar 2011, May 2, 2011

RE: Dewatering Permit Re-Application Request, Correspondence between SAIC and NYSDEC, May 31, 2011

RE: Estimated Treated Effluent Discharge Volume, Correspondence between SAIC and NYSDEC, July 1, 2011

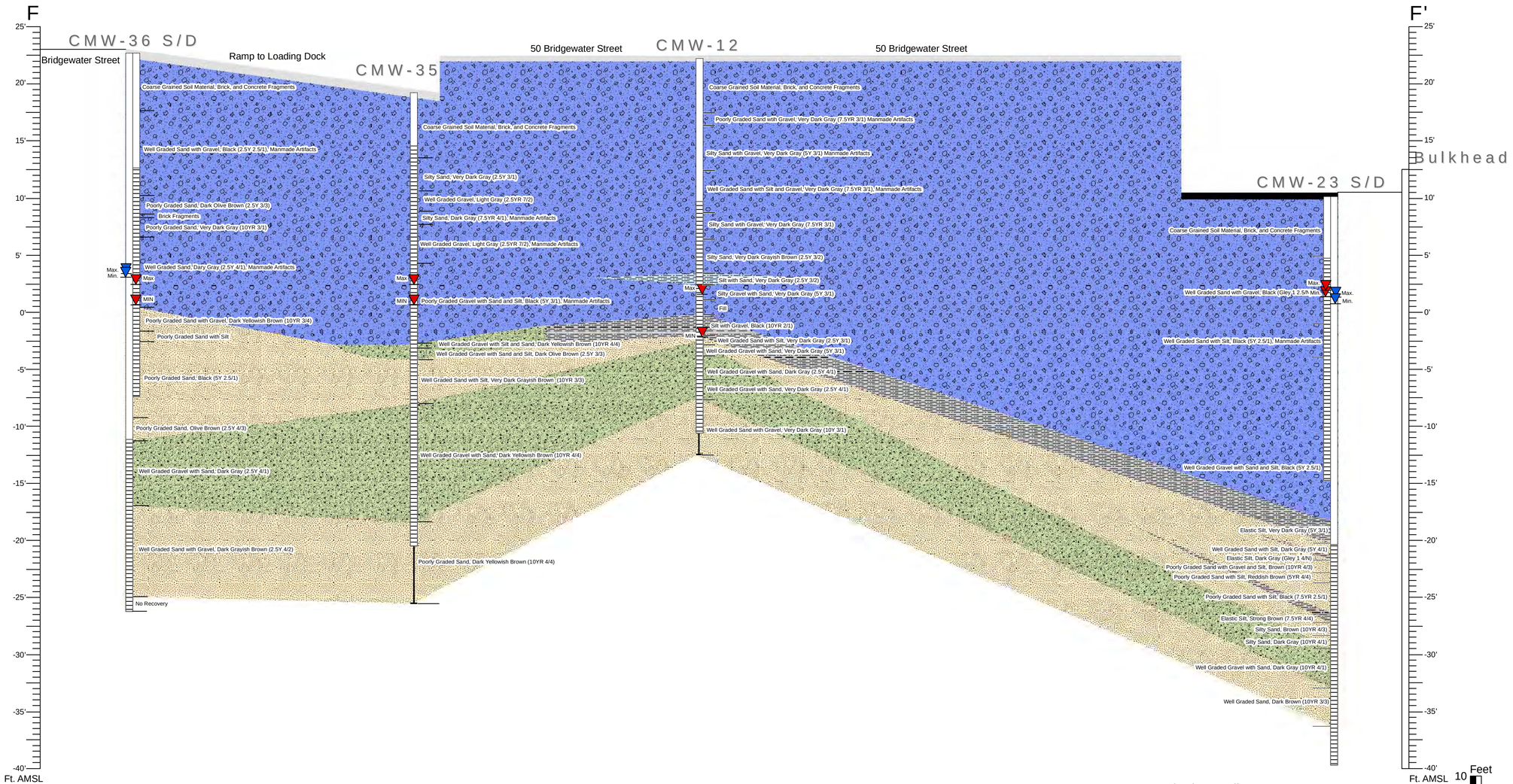
Soil and Soil Vapor Alternatives Analysis Report, July 15, 2011

Former Paragon Oil Terminal and the 100-120 Apollo Street Property, Texaco Facility #304209, Quarterly Status Report Apr-Jun 2011, July 29, 2011

Groundwater and PSH Alternatives Analysis Report, August 12, 2011

Former Paragon Oil Terminal and the 100-120 Apollo Street Property, Texaco Facility #304209, Quarterly Status Report July-Sept 2011, October 31, 2011

Former Paragon Oil Terminal and the 100-120 Apollo Street Property, Texaco Facility #304209, Quarterly Status Report Oct-Dec 2011, January 31, 2012



Legend

- Asphalt
- Concrete
- Lumber
- Peat
- Sand or Gravel with Manmade Artifacts
- Silt with Manmade Artifacts
- Sand without Manmade Artifacts
- Silt without Manmade Artifacts
- Gravel without Manmade Artifacts

Max ▽ Maximum Groundwater Elevation

Min ▽ Minimum Groundwater Elevation

Max ▽ Maximum Product Elevation

Min ▽ Minimum Product Elevation

Monitoring Well Location/ Soil Boring Location

CMW-5

Land Surface

Casing

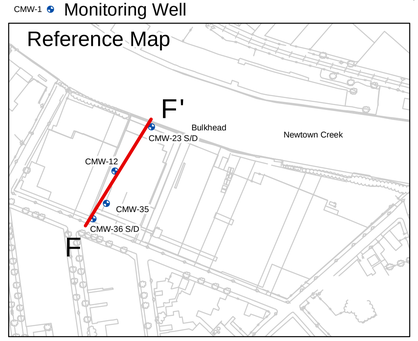
Screened Interval

Soil Boring

1.) Lithologic interpretations are based on observations noted by SAIC during the installation of Monitoring Wells (CMW) in the summer of 2006.
2.) Colors are used for diagrammatic purposes only.
3.) Groundwater and product measurements collected during gauging events in June of 2006.
4.) Groundwater and product elevations represent max and min values as noted during gauging events.
5.) Monitoring well widths are horizontally exaggerated for display purposes.
6.) FT. AMSL is feet above mean sea level.
7.) CMW-36 S/D and CMW-23 S/D are nested well pairs that include a deep and a shallow well.
8.) CMWs and SBs were installed by TEXACO Inc.

CMW-1 Monitoring Well

Reference Map



SCALES

Horizontal: 1"=20'

Vertical: 1"=5'

Vertical Exaggeration 4x

TEXACO Inc.

FORMER PARAGON OIL TERMINAL

GREENPOINT, BROOKLYN, NY

Stratigraphic Cross Section F-F'

Drawn:	Checked	Approved	Revisions
AGM 8/22/06	BFB 10/16/06	PJC 10/16/06	

SAIC

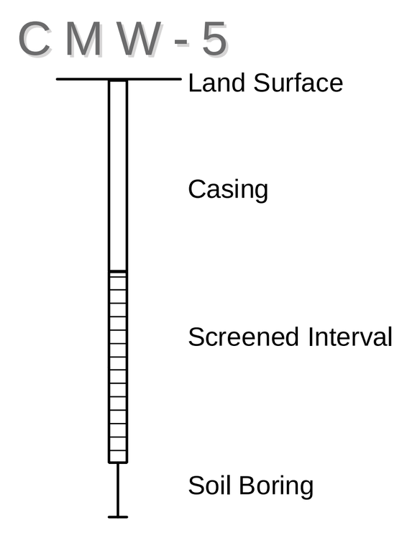
Figure No. 1

Legend

- Asphalt
- Sand or Gravel with Manmade Artifacts
- Concrete
- Lumber
- Peat
- Organic Soil
- Sand or Gravel with Manmade Artifacts
- Silt with Manmade Artifacts
- Sand without Manmade Artifacts
- Silt without Manmade Artifacts
- Gravel without Manmade Artifacts

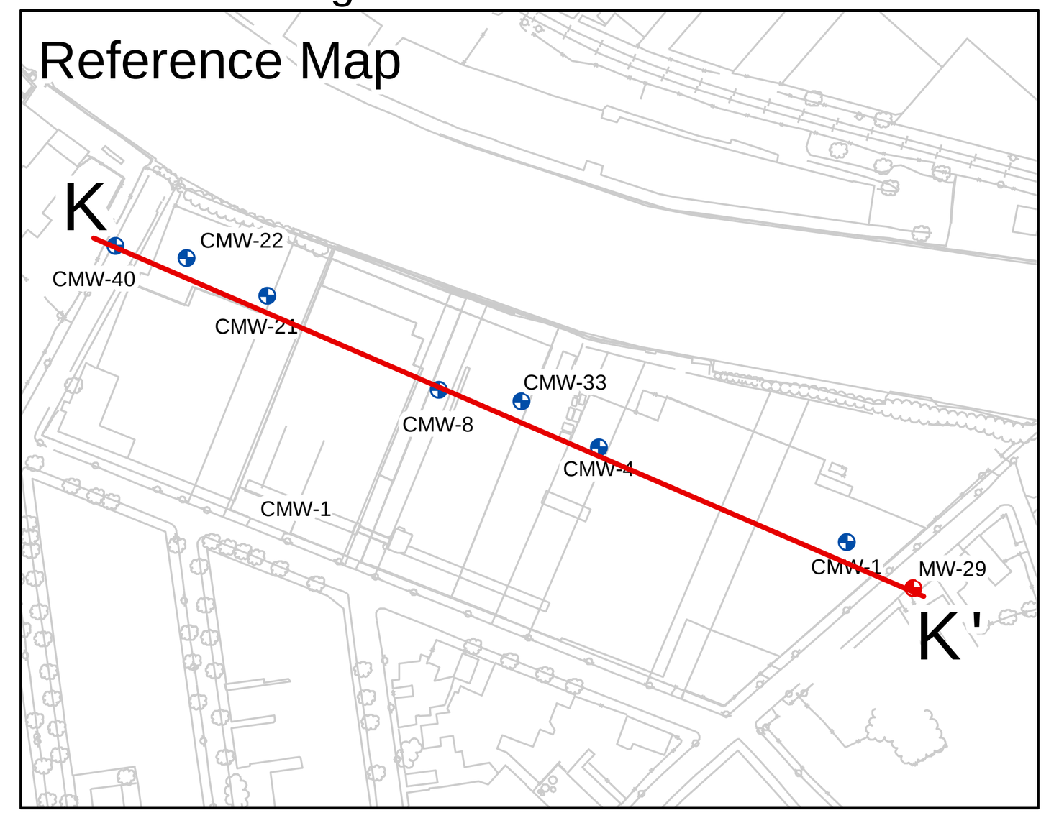
- Max Maximum Groundwater Elevation
- Min Minimum Groundwater Elevation
- Max Maximum Product Elevation
- Min Minimum Product Elevation

Monitoring Well Location/ Soil Boring Location



1.) Lithologic interpretations are based on observations noted by SAIC during the installation of Monitoring Wells (CMW) in the summer of 2005, spring of 2006 and summer of 2006.
2.) Colors are used for diagrammatic purposes only.
3.) Groundwater and product measurements collected during gauging events between May 2005 and June 2006.
4.) Groundwater and product elevations represent max and min values as noted during gauging events.
5.) Monitoring well widths are horizontally exaggerated for display purposes.
6.) Monitoring well MW-29 was installed by Roux Associates, Inc. in 1996.
7.) FT. AMSL is feet above mean sea level.
8.) CMWs and SBs installed by TEXACO Inc.

Reference Map



SCALES
Horizontal: 1"=30'
Vertical: 1"=4'
Vertical Exaggeration 7.5x

TEXACO Inc.

FORMER PARAGON OIL TERMINAL
GREENPOINT, BROOKLYN, NY

Stratigraphic Cross Section K-K'

Drawn:	Checked	Approved	Revisions
AGM 10/28/05	BFB 10/16/06	PJC 10/16/06	9/25/06

SAIC

Figure No. 2

Figure 3
Reversed Hydraulic Gradient Concept Maintained to Mitigate Seep

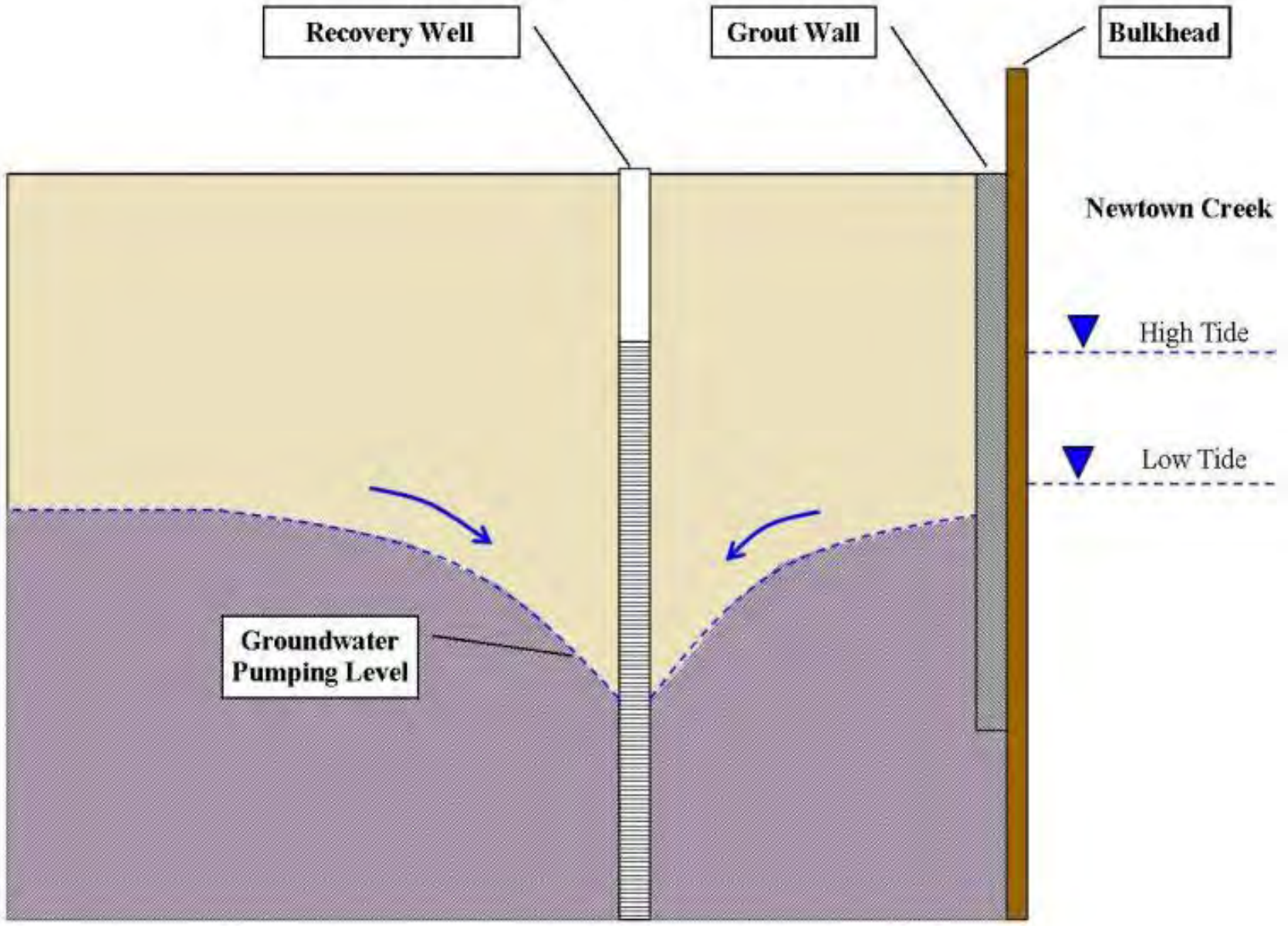
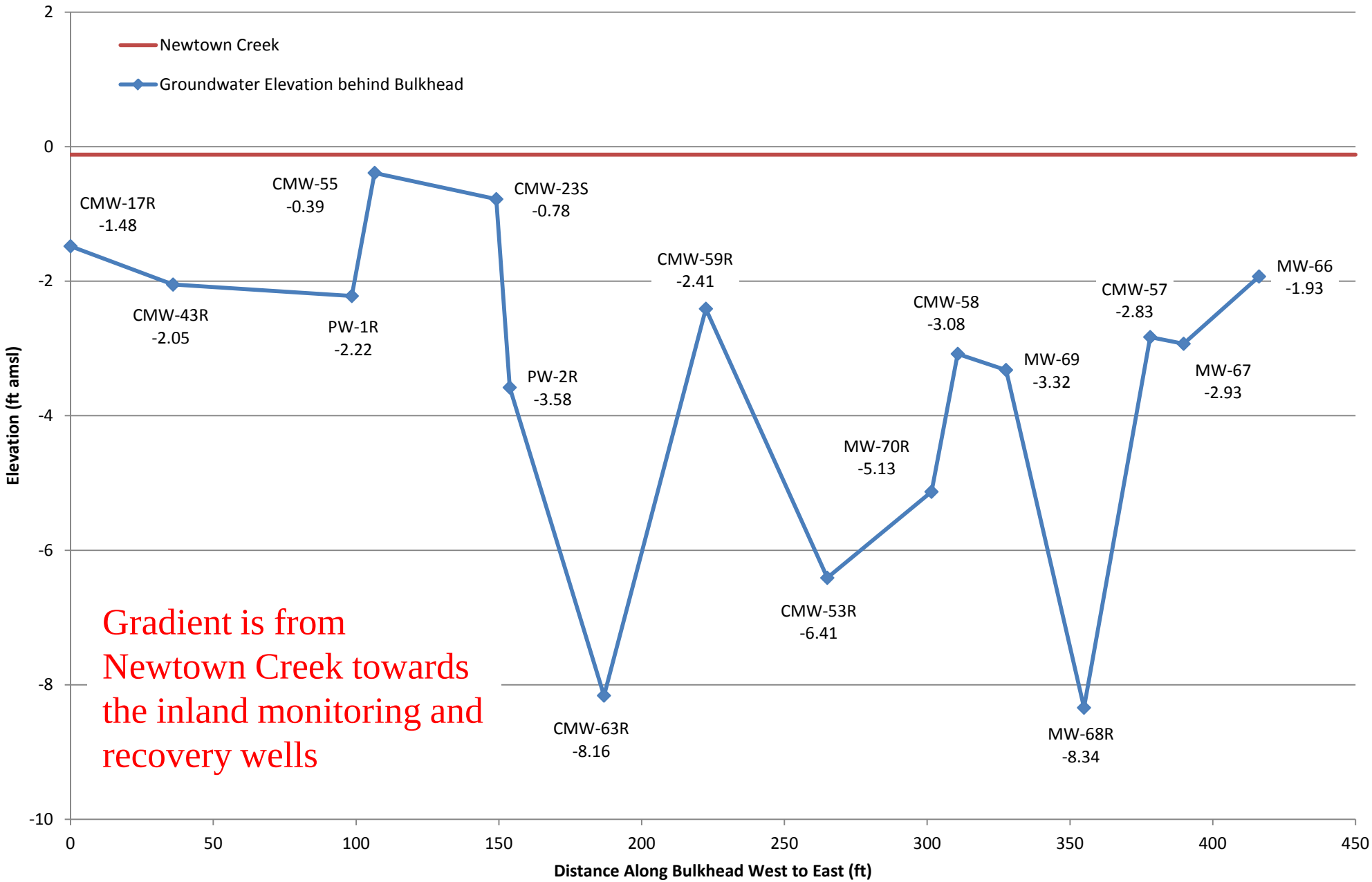
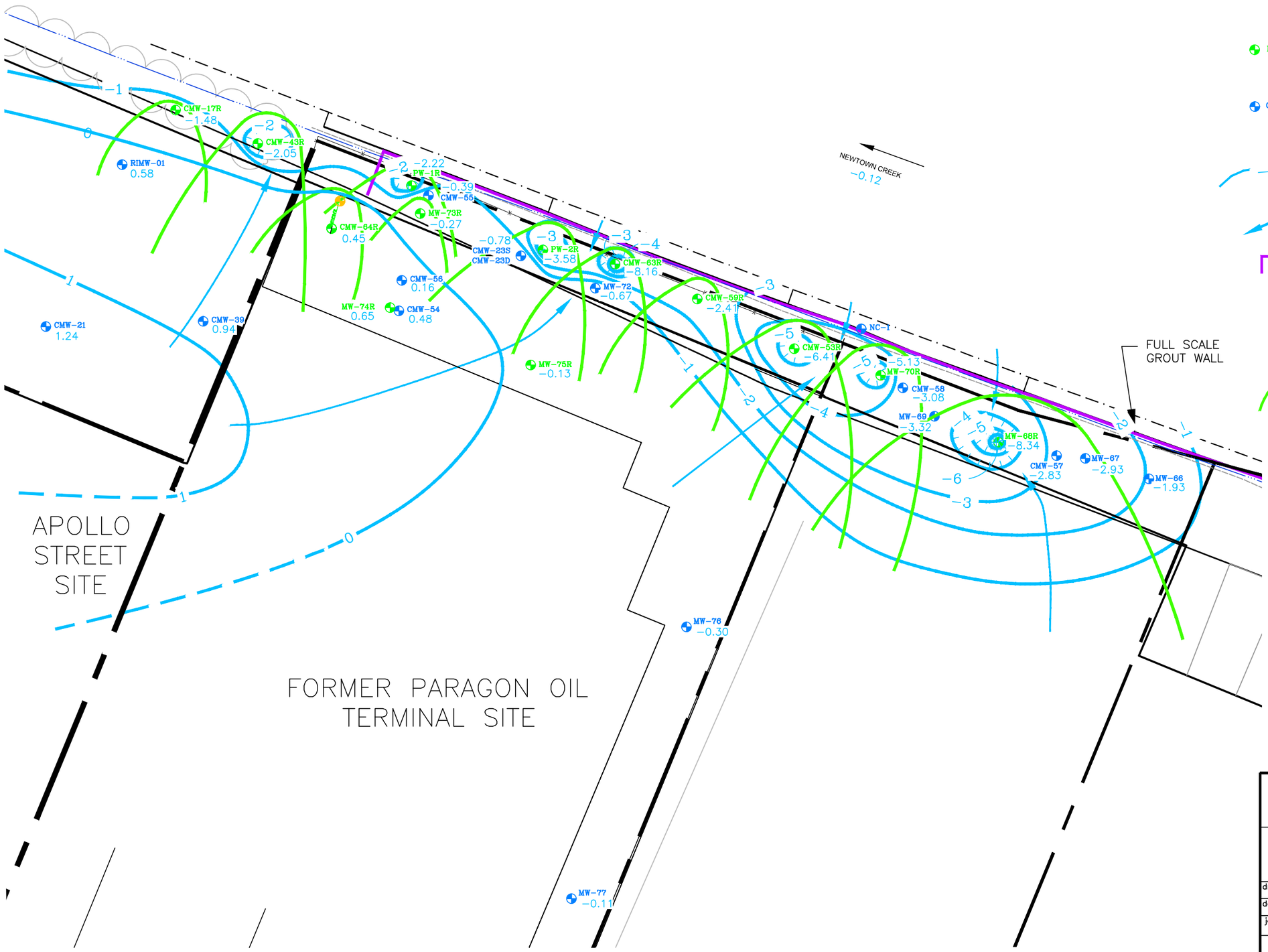


Figure 4
Comparison of Surface Water Elevation in Newtown Creek with Groundwater Directly Behind the Bulkhead Along the Former Seep Area

Comparison taken at Low Tide on September 21, 2010 (14:35)





LEGEND

MW-74R
-2.41
RECOVERY WELL WITH GROUNDWATER ELEVATION (FT. AMSL)

CMW-56
-0.39
MONITORING WELL WITH GROUNDWATER ELEVATION (FT. AMSL)

-2
GROUNDWATER ELEVATION CONTOUR (DASHED WHERE INFERRED)

INTERPRETED GROUNDWATER FLOW DIRECTION

FULL SCALE GROUT WALLL

LOCATION OF WATER LEVEL IN CMW-64R (DIAGONAL WELL -52.5' ALONG THE AZIMUTH ANGLE N15°24'E). WATER LEVEL IS 2.49' ALONG THIS ANGLE FROM THE SURFACE LOCATION OF THIS WELL.

ZONE OF INTERPRETED CAPTURE. DETERMINED USING PRE-PUMPING GROUNDWATER GRADIENTS, PUMPING RATES, & GROUNDWATER ELEVATIONS AS PER THE TODD EQUATION.

N

40' 0 40'

SCALE IN FEET

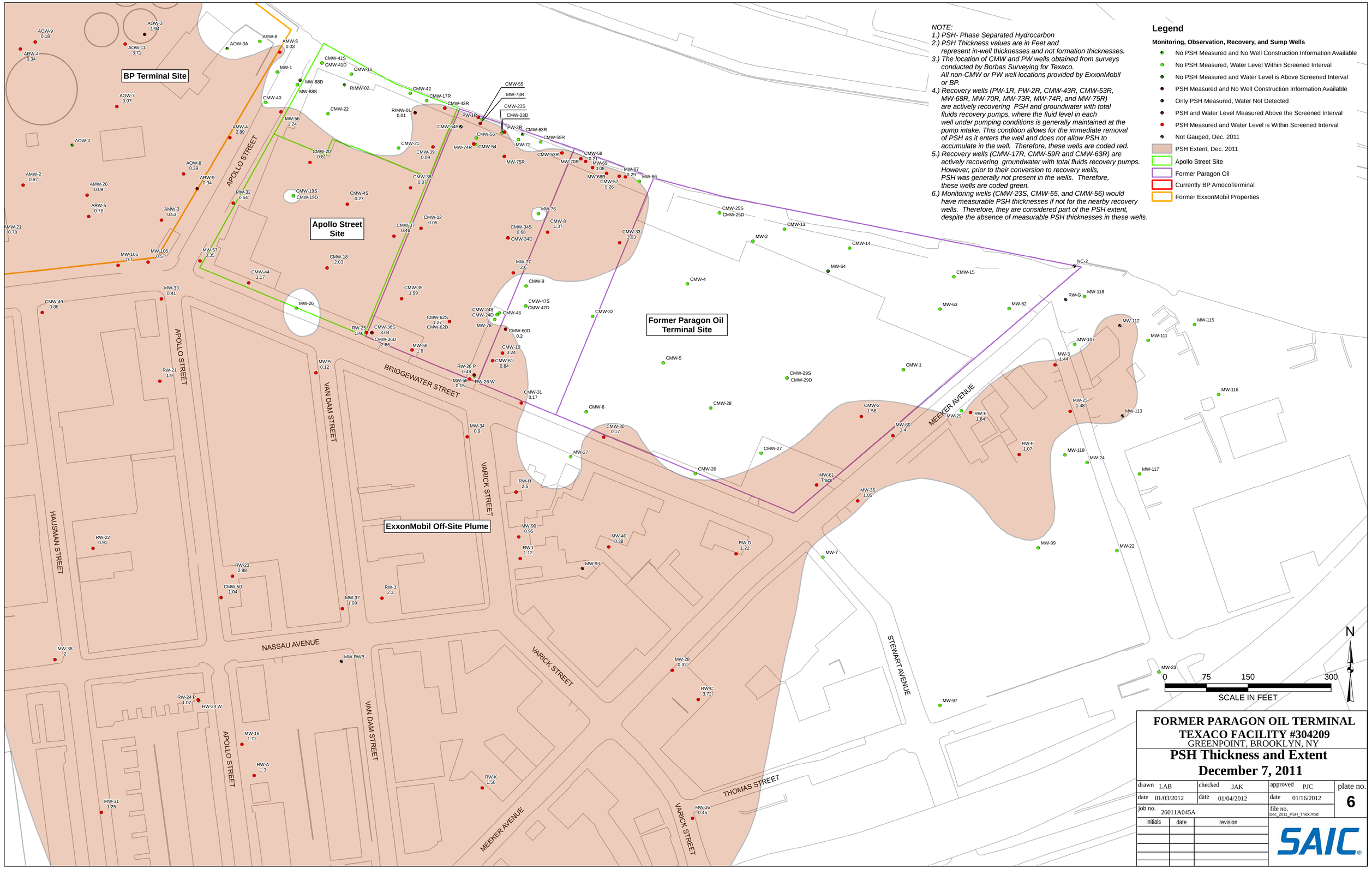
FORMER PARAGON OIL TERMINAL
TEXACO FACILITY #304209

GREENPOINT, BROOKLYN, NY

PSH AND GROUNDWATER CAPTURE ZONE
SEPTEMBER 21, 2010
LOW TIDE

drawn	checked	approved	figure no.
RAM	JAK	PJC	5
date 10/06/10	date 10/26/10	date 10/26/10	
job no. 46010AT106-A10-020		file no. T106-003SSCR.dwg	

SAIC
From Science to Solutions



NOTE:

1. *PSH- Phase Separated Hydrocarbon*
2. *PSH Thickness values are in Feet and represent in-well thicknesses and not formation thicknesses.*
3. *The location of CMW and PW wells obtained from surveys conducted by Borbas Surveying for Texaco. All non-CMW or PW well locations provided by ExxonMobil or BP.*
4. *Recovery wells (PW-1R, PW-2R, CMW-43R, CMW-53R, MW-68R, MW-70R, MW-73R, MW-74R, and MW-75R) are actively recovering PSH and groundwater with total fluids recovery pumps, where the fluid level in each well under pumping conditions is generally maintained at the pump intake. This condition allows for the immediate removal of PSH as it enters the well and does not allow PSH to accumulate in the well. Therefore, these wells are coded red.*
5. *Recovery wells (CMW-17R, CMW-59R and CMW-63R) are actively recovering groundwater with total fluids recovery pumps. However, prior to their conversion to recovery wells, PSH was generally not present in the wells. Therefore, these wells are coded green.*
6. *Monitoring wells (CMW-23S, CMW-55, and CMW-56) would have measurable PSH thicknesses if not for the nearby recovery wells. Therefore, they are considered part of the PSH extent, despite the absence of measurable PSH thicknesses in these wells.*

Legend

Monitoring, Observation, Recovery, and Sump Wells

- No PSH Measured and No Well Construction Information Available
- No PSH Measured, Water Level Within Screened Interval
- No PSH Measured and Water Level is Above Screened Interval
- PSH Measured and No Well Construction Information Available
- Only PSH Measured, Water Not Detected
- PSH and Water Level Measured Above the Screened Interval
- PSH Measured and Water Level is Within Screened Interval
- Not Gauged, Dec. 2011
- PSH Extent, Dec. 2011
- Apollo Street Site
- Former Paragon Oil
- Currently BP AmocoTerminal
- Former ExxonMobil Properties

FORMER PARAGON OIL TERMINAL
TEXACO FACILITY #304209
GREENPOINT, BROOKLYN, NY

PSH Thickness and Extent
December 7, 2011

drawn LAB	checked JAK	approved PJC	plate no. 6
date 01/03/2012	date 01/04/2012	date 01/16/2012	
job no. 26011A045A		file no. Dec_2011_PSH_Thick.mxd	

initials	date	revision

SAIC®

NYC Identified Outfalls to Newtown Creek
at the Former Paragon Oil Company Terminal

Drawn:	Checked	Approved	Revisions
LAB 3/28/12			LAB 5/14/12

SAIC

Figure No.
7

O:\CAD\HBG\ENV\GIS_Data\CVX\Greenpoint, NY\2012\Newtown Creek\Projects\Paragon outfalls upland summary.mxd

Treatment System Layout

CMW-42
WATER TREATMENT BUILDING
CHEMICAL FEED SHED
OIL WATER SEPARATOR BUILDING
UNTREATED WATER TANK
PRE OIL WATER SEPARATOR TANK
CONCRETE PAD
PSH TANK
BACKWASH TANK
TRANSFER PUMP CONTAINMENT BOX
CMW-17R
RIMW-01
CMW-43R
PW-1R
CMW-55
COMPRESSOR SHED
CMW-64R
MW-73R
Newtwon Creek
CMW-23 S/D
PW-2R
CMW-63R
Bulkhead
CMW-56
MW-72
CMW-59R
RECOVERY PIPES
CMW-39
MW-74R
CMW-54
CMW-53R
MW-70R
CMW-58
MW-69
MW-75R
MW-68R
CMW-57

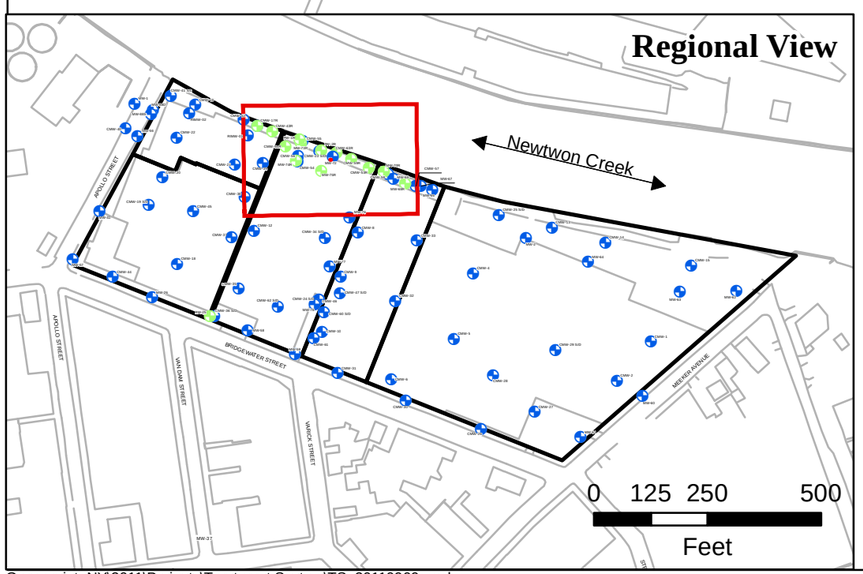
Legend

- Recovery Well
- Monitoring Well

Treatment System Layout

- Treatment System Building
- Fence
- Tank
- Piping

Regional View



0 12.5 25 50
Feet

N

FORMER PARAGON OIL TERMINAL
TEXACO FACILITY #304209
GREENPOINT, BROOKLYN, NY

Location of Site Monitoring Wells and Total Fluids Recovery System

drawn	checked	approved	Figure No.
AGM	JAK	PJC	8
date 1/19/2010	date 7/29/2010	date 7/29/2010	
job no. 26011A045A		file no. TS_20110909	

initials	date	revision
LAB	7/25/11	Update data frame positions
LAB	9/9/11	Correct fluid line location
LAB	11/17/11	Update logo/job #

SAIC

Greenpoint, NY\2011\Projects\Treatment System\TS_20110909.mxd